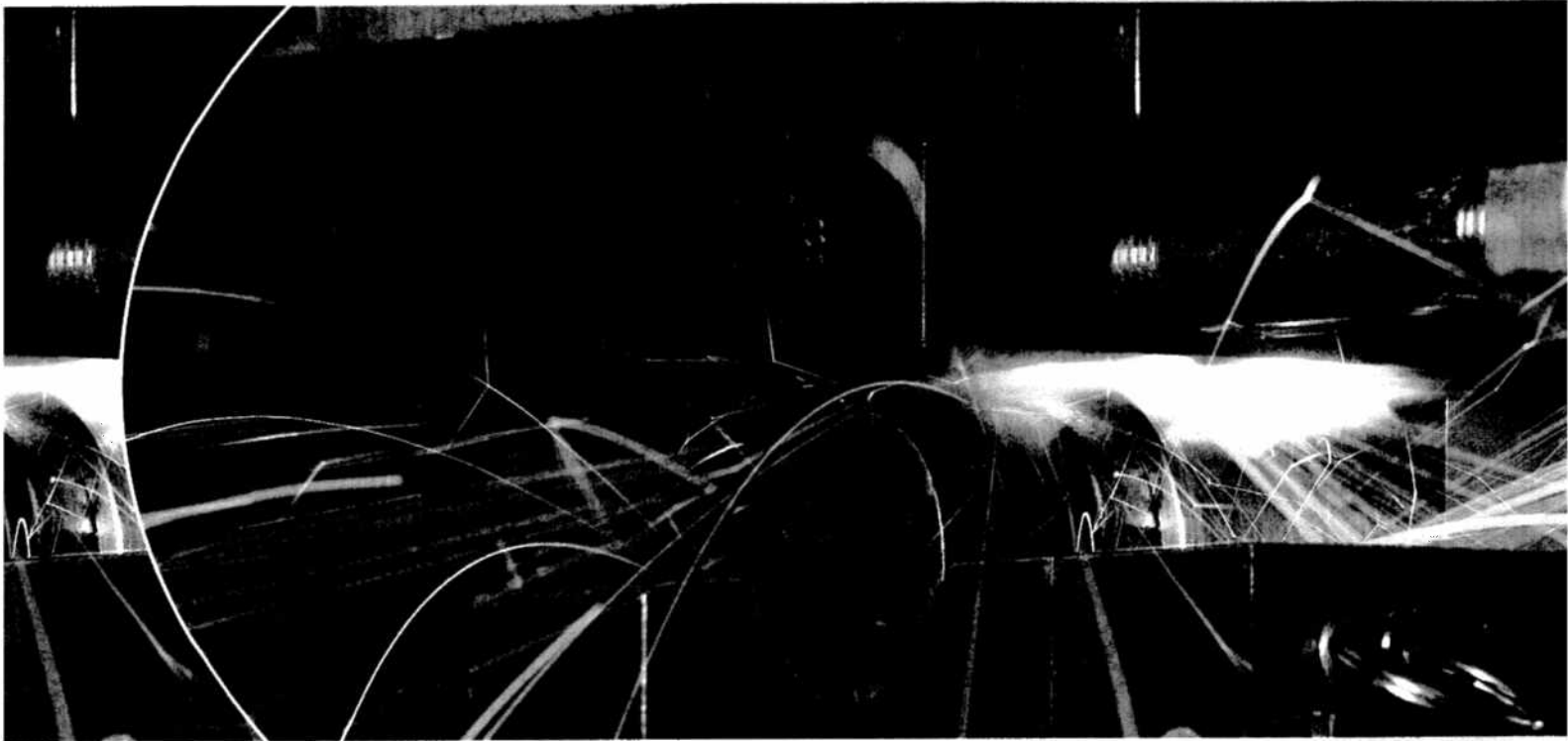


# DEFORMATION RESISTANCE WELDING™




**A revolutionary new process.  
Exciting new possibilities.**



Developed with funding by NASA for its Man on the Moon and Man to Mars projects, Deformation Resistance Welding brings new design flexibility and cost savings to the manufacturing process.

## What is DRW?

Deformation Resistance Welding (DRW) is a revolutionary new metal-joining technology that delivers reliable, repeatable welds at significantly lower cost than conventional welding solutions. The DRW process allows the welding of similar and selected dissimilar materials as well.



DRW forms a near instantaneous, full strength, leak-tight weld. Unlike conventional welding methods, DRW heats metal surfaces only to the point of softening followed by rapid, engineered compression of the joint. The process automatically bonds metals and creates solid-state joints through the heating and deformation of mating surfaces. The result is a full thickness, superior, solid-state weld that gives designers new freedom to create lean structural assemblies using tubular components.

## What are the benefits of DRW?

The DRW process can reduce cycle time and the cost of making a variety of structures using hollow members. Typically, a manufacturing operation using DRW can realize benefits in the following areas:

- Lower materials and capital cost
- Reduced welding cycle time by up to 79%
- Solid-state weld flexibility
- Geometry-independence
- Automation friendly
- Joining of dissimilar materials and shapes
- Leak tight welds
- A weld that is stronger than the parent metal
- Elimination of tube thinning and porosity
- Extended product service life
- No filler material required
- Localized heat application

## What manufacturing areas can use the DRW process?

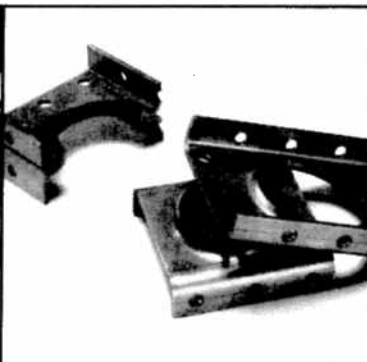
DRW has broad application to all areas of manufacturing. Because of its unique ability to handle tube-to-tube and tube-to-sheet welding, DRW literally changes the game with regard to any type of tubular product manufacturing.



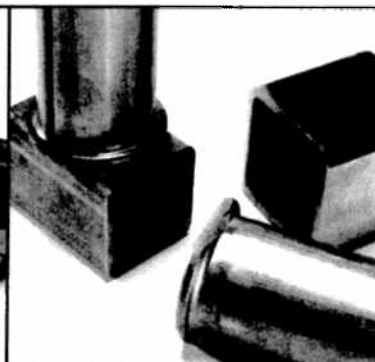
The advanced DRW process was originally developed by Delphi Corporation as a way to cut costs, improve material performance and optimize the welding process. SpaceForm was set up by Delphi Technologies, Inc. (DTI), which is a wholly owned subsidiary of Delphi Corp., to commercialize this patented technology in the mobile structures market.



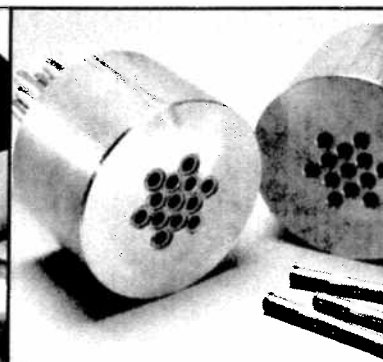
Shock



New Joint Design



Trailer Hitch



Heat Exchanger

#### DRW is ideally suited for:

- load-bearing structural applications
- mobile medical products
- automobiles
- bicycles
- motorcycles
- commercial vehicles
- recreational vehicles

Because of the exceptional strength and leak tightness associated with DRW, the process shows outstanding application opportunities for tubular spaceframes, exhaust systems and other fluid based mechanical systems using a tubular component.

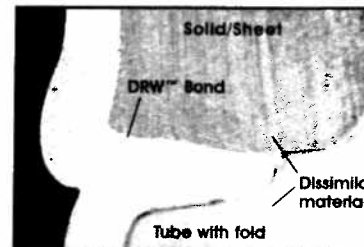
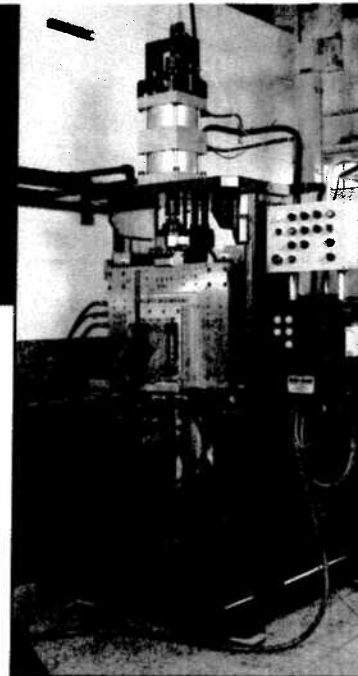
#### How can I put DRW to work in my operation?

SpaceForm will work with you to provide design services and commercial access to

DRW technology. We will maintain and coordinate a central knowledge base that will benefit all users of DRW.

SpaceForm has formed a strategic alliance with Edison Welding Institute (EWI) in Columbus, Ohio, to offer customized product development services to customers in the manufacturing and automotive industries. As a DRW customer you will have access to the extensive resources and staff of EWI to design and carry out feasibility, prototype and validation studies.

To learn more about the unique opportunities available through the revolutionary DRW process and how SpaceForm will work with you to put this time and money-saving welding technology to work for you, call SpaceForm at 877.501.3400, or e-mail us at [info@spaceformtech.com](mailto:info@spaceformtech.com).



Cross-section shown at 20X magnification.

#### TYPICAL WELDING METHODS COMPARISON

SpaceForm has validated the impact of the DRW welding process on a variety of tube-to-tube/sheet/solid materials. The results are representative of the DRW process for welding various pieces, and we will be happy to share our findings with you.

The comparison examples shown below are based on welding the inlet/outlet tube to the fuel tank cover for a typical automotive application.

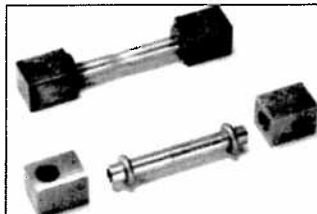
FEATURE	BRAZING	ARC WELDING	DRW
Process	Batch	Line	Line
Total Cycle Time	Several minutes	>20 sec	<6 sec
Material Limitations	Yes	Yes	Currently assessing
Join Length Dependent	No	Yes	No
Utilities	Gas, Water, Electric	Gas, Water, Electric	Water/Electric
Filler Weld Material	Copper/other filler	Filler wire, shielding gas	None
Material Strength Loss	Yes	Yes	No

**ASME CERTIFIES DRW  
Deformation  
Resistance Welding**  
has been certified by  
the American Society  
of Mechanical  
Engineers (Approval  
#2463) as a nationally  
recognized  
manufacturing  
process for tube-to-  
tubesheet welding.

Deformation Resistance Welding is being rigorously tested and has been shown to produce strong, uniform and leak-tight welds for a wide variety of applications and materials.



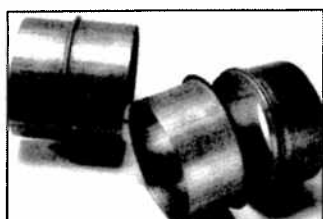
Suspension Link



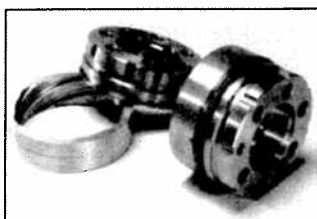
Tube to Block



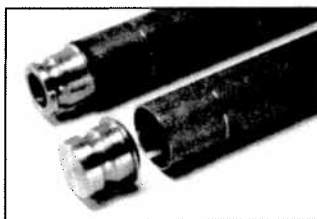
Fuel Filler Cap



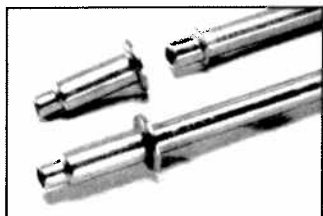
Catalytic Converter



TC Actuator



Damper



Fuel Rail



Spindle



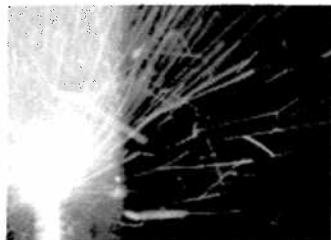
Shock & Strut Rod



Hydraulic Valve Lifter



SpaceForm, Inc  
TechTown One  
440 Burrough Street, Suite 109  
Detroit, MI 48202  
877.501.3400  
[info@spaceformtech.com](mailto:info@spaceformtech.com)

[INDUSTRIES](#) / [CAPABILITIES](#) / [SERVICES](#) / [EDUCATION & TRAINING](#) / [MEMBERSHIP](#) / [COMPANY](#)[Home](#) > [G](#) > [Company](#) > EWI and SpaceForm Announce Strategic Alliance

## NEWS

### **EWI AND SPACEFORM ANNOUNCE STRATEGIC ALLIANCE Companies to Jointly Develop and Market Innovative Deformation Resistance Welding Technology**

**8/22/2006** - DETROIT, MICHIGAN -- SpaceForm, Inc., a Delphi spinoff company, and Edison Welding Institute (EWI) have announced that EWI will become SpaceForm's R&D development partner and actively participate in the commercialization and production scale-up activities of SpaceForm's Deformation Resistance Welding (DRW) technology. This alliance will enable SpaceForm to advance DRW development toward production capabilities, narrow manufacturing parameters, and become a reliable, proven process.

DRW is a revolutionary welding process. DRW forms near instantaneous, full strength, automated leak-tight welds. With DRW, designers can create lean structural assemblies by using tubular components. Tubes may be joined to other tubes, sheets or solids optimizing cost and performance.

Henry Cialone, CEO of EWI, stated, "Delphi has been a pioneer in the area of deformation resistance welding and we're pleased to have helped in scaling up the process. Now, we look forward to working with SpaceForm to develop the process for structural mobile applications. DRW offers additional design flexibility to achieve strong, lightweight structures at a competitive cost. We see promising uses for this technology in the automotive industry and a variety of other areas."

Timothy Forbes, acting CEO of SpaceForm and Delphi Corporation Director for Technology Commercialization and Licensing said, "The potential cost and quality advantages of DRW coupled with EWI's preeminent status as the leading material joining institute bode well for SpaceForm to provide innovative welding solutions to our customers."

Together, SpaceForm and EWI plan to offer customized product development services to the automotive and manufacturing industries. Customers will utilize the extensive resources and staff of Columbus-based EWI to design and carryout feasibility, prototype, and validation studies. SpaceForm will provide customers with design services and commercial access to the technology and coordinate a central knowledge basis that will benefit all users of DRW.

According to Alain Piette, Executive Director of Business and Product Development for SpaceForm, "The market will appreciate the energy and efficiency that EWI and SpaceForm bring to the manufacturing

## COMPANY /

[News](#)  
[Events](#)  
[Partners](#)  
[Careers](#)  
[Executives](#)[EWI Home](#)

industry allowing responsive, thorough testing of DRW for challenging applications. These applications reduce cost and mass, improve quality, and create lean structures."

The development and commercialization of DRW has been accelerated through a number of notable achievements:

- Certification of DRW by the American Society of Mechanical Engineers (ASME) as a nationally recognized manufacturing process (approval code 2463)
- Multi-year, multi-million dollar grants from NASA and the Michigan Research Institute to Delphi for evaluation of DRW in NASAs Man on the Moon and Man to Mars expeditionary missions
- Winner of the 2006 Michigan Technology Leaders Corporate Partnership Award
- Start-up investment funding from the Michigan Economic Development Corporations Tri-Corridor Fund

© 2006 EWI | LEGAL | SITE MAP

**About SpaceForm:** SpaceForm is an advanced welding company set up to commercialize the patented Deformation Resistance Welding process as a way to cut costs, improve material performance, and optimize the welding technology for mobile structures. Headquartered in TechTown, Detroit's Research and Technology Park, SpaceForm was established by Delphi Corp., Automation Alley and the Michigan Economic Development Corporation. For more information on SpaceForm visit [www.spaceformtech.com](http://www.spaceformtech.com).

[Learn more about EWI](#)

[Contact EWI's PR Department](#)